

Department of Consumer Affairs
Bureau of Automotive Repair

Permanent Diagnostic Trouble Codes

Greg Coburn, Engineering and Research Branch
BAR Advisory Group Meeting
October 19, 2017

OBD Inspection Regulation

CCR 3340.42.2(c) Starting on or after January 1, 2013, OBD equipped vehicles shall fail the OBD inspection if any one of the following conditions occurs as applicable to the vehicle:

- (1) The vehicle's MIL does not illuminate when the ignition is on and the engine is off (prior to 2009)
- (2) The vehicle's MIL illuminates continuously or flashes with the engine running (prior to 2009)
- (3) The vehicle's OBD system reports the MIL as commanded on (prior to 2009)
- (4) The vehicle's OBD system reports a Diagnostic Trouble Code (DTC) (prior to 2009)

OBD Inspection Regulation

- (5) The vehicle's OBD system data indicates the system has not yet been sufficiently operated to determine the presence or absence of a DTC (mid-2018)
- (6) The vehicle's OBD system does not communicate with the EIS or OIS (CY 2000)
- (7) The vehicle's OBD system data is inappropriate for the vehicle being tested (February 2017)
- (8) The vehicle's OBD system data does not match the original equipment manufacturer (OEM) or an Air Resources Board (ARB) exempted OBD software configuration (TBD)

OBD Inspection Regulation

(9) The vehicle's OBD system reports incomplete readiness monitor(s) as specified below (June 2015):

(A) Gasoline-powered vehicles model-years 1996 through 1999 with more than one (1) incomplete monitor

(B) Gasoline-powered vehicles model-years 2000 and newer with any incomplete monitors, excluding the evaporative system monitor

(C) Diesel-powered vehicles model-years 1998 through 2006 with any incomplete monitors

(D) Diesel-powered vehicles model-years 2007 and newer with any incomplete monitors, excluding the particulate filter system monitor

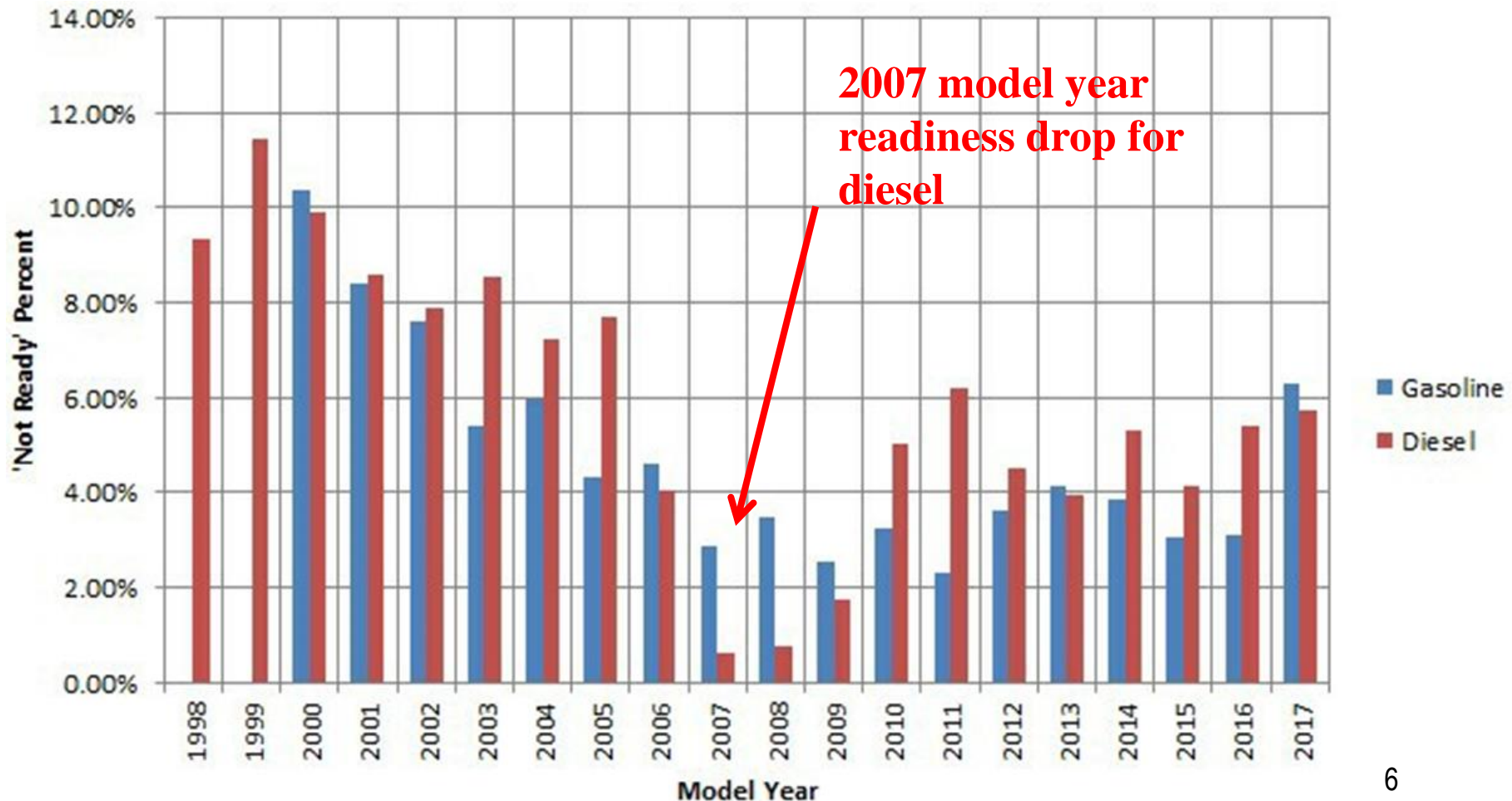
Current Readiness Standards

Table 1: OBD Test Monitor Readiness Standards
(Implemented May 4, 2015)

Model Years	Fuel Type	Number of Incomplete Monitors Allowed to Pass OBD Test
1996-1999	Gas ¹	Any one
2000 and newer	Gas ¹	Evaporative system
1998-2006	Diesel	Zero
2007 and newer	Diesel	Any two

¹ "Gas" includes gasoline, propane, natural gas (CNG, LNG, LPG)

“Not Ready” by Model Year & Fuel



Permanent DTCs

- Available through Mode \$0A
- Same format as Mode \$03 (Pxxxx)
- Not erasable by scan tool or battery disconnect
 - Stored in non-volatile memory (NVRAM)
- Only the OBD system itself can erase the code
 - After that same monitor has run and passed
- Phase-in: 2010-2012 Model Years

Warm-up Counts and Distance Traveled

- **Mode \$01 PID \$30:** Number of warm-up cycles conducted since OBD-II codes were cleared
- **Mode \$01 PID \$31:** Distance traveled since codes cleared
- Supported by most 2007 and newer diesel and most 2009 and newer gasoline vehicles
- Can be used with P-DTCs to determine vehicle readiness to test per CCR 3340.42.2(c)(5)

P-DTC and PID Support by Model Year & Fuel

PID \$30:
number of warm-ups since codes were cleared.

PID \$31:
distance traveled since codes were cleared.

MODEL YEAR	DIESEL				GASOLINE			
	TESTS	PID30 SUPPORT	PID31 SUPPORT	PERMDTC SUPPORT	TESTS	PID30 SUPPORT	PID31 SUPPORT	PERMDTC SUPPORT
1998	361	0.00%	0.00%	0.00%				
1999	1,388	0.07%	0.07%	0.00%				
2000	1,334	0.15%	0.15%	0.00%	72,030	0.06%	0.06%	0.00%
2001	1,877	0.32%	0.32%	0.00%	116,784	0.05%	0.05%	0.00%
2002	1,933	0.00%	0.00%	0.00%	76,224	0.02%	0.02%	0.00%
2003	2,398	0.17%	0.21%	0.00%	134,925	0.29%	0.29%	0.00%
2004	2,669	38.29%	38.29%	0.00%	80,975	6.05%	6.05%	0.00%
2005	2,921	46.32%	46.32%	0.00%	150,768	27.21%	27.21%	0.00%
2006	3,322	93.71%	93.71%	0.00%	79,289	49.42%	49.42%	0.00%
2007	2,057	99.42%	99.42%	0.00%	158,892	73.63%	73.63%	0.00%
2008	1,999	99.60%	99.60%	0.00%	68,022	98.70%	98.70%	0.00%
2009	722	99.86%	99.86%	0.00%	98,013	99.93%	99.93%	0.00%
2010	700	99.86%	99.86%	73.71%	39,700	99.93%	99.93%	73.03%
2011	2,220	99.91%	99.91%	99.59%	144,465	99.95%	99.95%	93.93%
2012	1,638	99.82%	99.82%	99.45%	22,886	99.93%	99.92%	98.46%
2013	1,990	99.95%	99.95%	99.65%	31,882	99.97%	99.97%	99.14%
2014	1,935	99.90%	99.90%	99.53%	19,600	99.91%	99.91%	99.63%
2015	4,826	99.90%	99.90%	99.21%	17,211	99.95%	99.95%	99.80%
2016	939	99.89%	99.89%	99.36%	17,240	99.90%	99.90%	99.78%
2017	279	100.00%	100.00%	98.92%	2,967	99.87%	99.87%	99.53%

Diesel (light-duty) Monitor Support by Model Year

Table 2: Diesel Monitor Support by Model Year

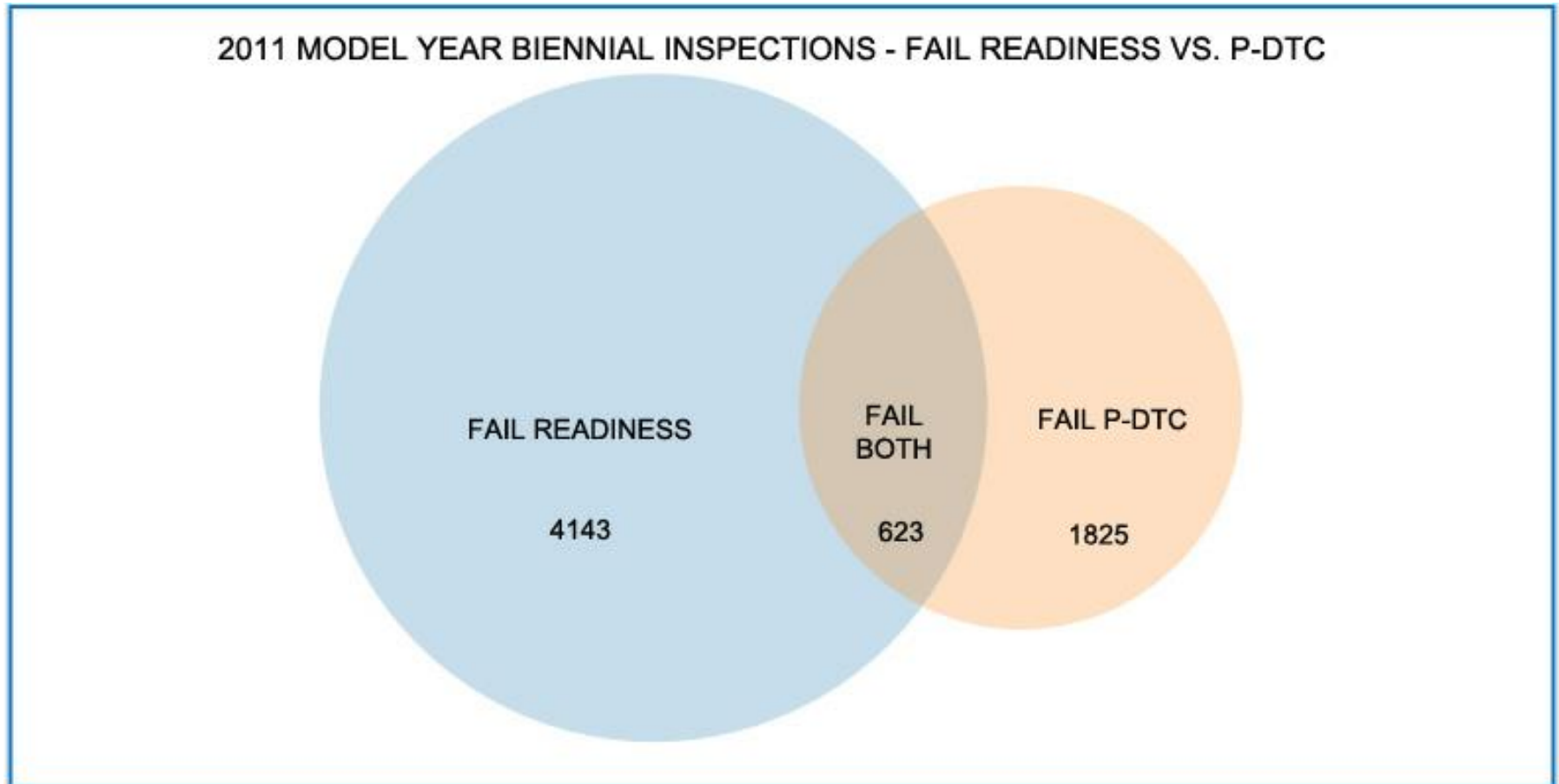
Model Year	Total Tests	NMHC CAT Monitor Support	NOx/SCR Monitor Support	Boost Pressure Monitor Support	Exh Gas Sensor Monitor Support	PM Filter Monitor Support	EGR/VVT Monitor Support	Inc. Monitors Currently Allowed
1998	592	0.3%	0.2%	0.0%	0.0%	0.0%	47.1%	0
1999	2,194	0.5%	0.0%	0.0%	0.4%	0.4%	5.2%	0
2000	2,337	0.2%	0.0%	0.0%	0.1%	0.1%	5.6%	0
2001	3,078	0.1%	0.0%	0.0%	0.1%	0.1%	3.1%	0
2002	3,594	0.3%	0.0%	0.0%	0.3%	0.3%	29.3%	0
2003	4,097	0.5%	0.0%	0.0%	0.3%	0.3%	54.5%	0
2004	4,690	0.8%	0.0%	0.0%	4.1%	4.0%	77.3%	0
2005	4,432	0.7%	0.1%	0.1%	4.5%	4.5%	73.3%	0
2006	6,129	0.5%	0.0%	0.0%	3.7%	3.7%	78.4%	0
2007	3,197	32.4%	0.1%	0.1%	11.2%	10.4%	83.3%	2
2008	3,790	94.9%	0.1%	0.1%	16.3%	15.8%	98.3%	2
2009	1,228	96.3%	32.4%	4.9%	25.7%	25.0%	98.5%	2
2010	2,256	98.3%	81.3%	81.3%	81.4%	81.3%	99.5%	2
2011	3,512	99.4%	99.0%	99.5%	99.5%	99.5%	99.4%	2
2012	3,880	99.6%	99.4%	99.6%	99.6%	99.6%	99.6%	2
2013	3,194	99.8%	99.7%	99.8%	99.8%	99.8%	99.8%	2
2014	5,373	87.8%	99.9%	99.9%	100.0%	100.0%	100.0%	2
2015	6,482	92.5%	99.7%	99.9%	99.8%	99.8%	99.9%	2
2016	1,951	93.7%	99.9%	99.9%	99.9%	99.9%	99.9%	2

Adding P-DTCs to Smog Check

- Vehicles with P-DTC would fail Smog Check, unless:
 - 30 warm-ups¹ have occurred; and
 - 500 miles¹ have been driven
 - as determined by Mode \$01 PIDs \$30 and \$31
 - sufficient operation of the vehicle has occurred to allow the MIL to re-illuminate and it hasn't
 - the vehicle may have a problem clearing the P-DTC

¹ USEPA document, "Best Practices for Addressing OBD Readiness in IM Testing of Diesel Vehicles Under 14,000 Pounds Gross Vehicle Weight Rating," dated March 7, 2013

P-DTC vs. Readiness



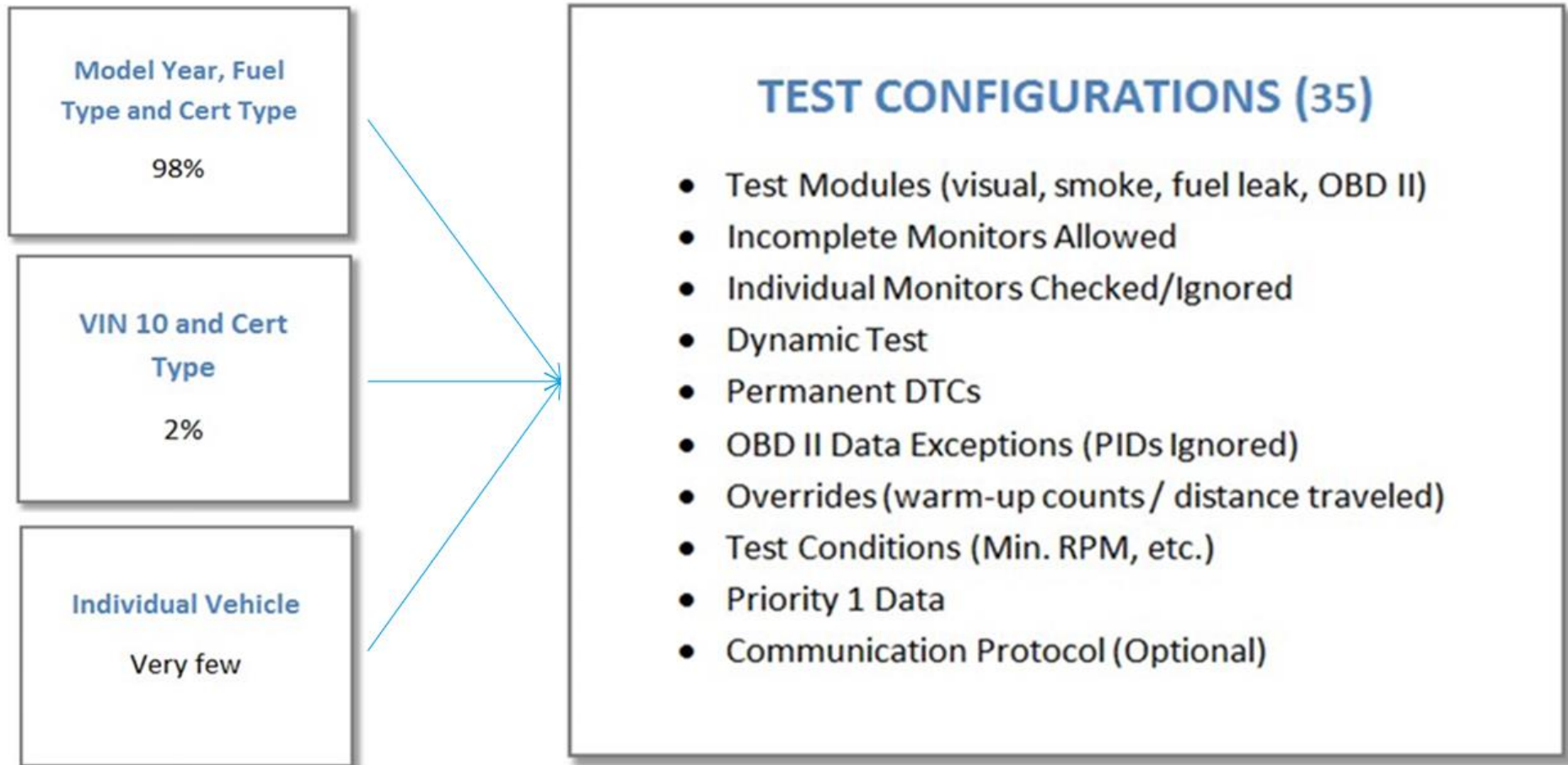
Analysis

- Adding PDTC failure criteria is estimated to increase overall Smog Check failure rate by approximately **1%**
- Vehicles passing today that would fail the P-DTC test:
 - Have a median warm-up count of **4** and median distance traveled of **40** miles. This indicates recent code clearing.
 - **52%** have incomplete evaporative system monitors

Implementation Status

- Planned implementation mid-2018
- Apply a P-DTC check with warm-up and mileage override
- Allow exceptions for problem vehicles while OEMs work on fixes, if needed
- VIR would show new fail reason (Permanent DTC)
- BAR outreach to consumers and Smog Check industry

OIS Vehicle Specific Issue Handling



Questions and Comments

Submit additional questions and/or comments to:

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